The Enigma of Coral Castle

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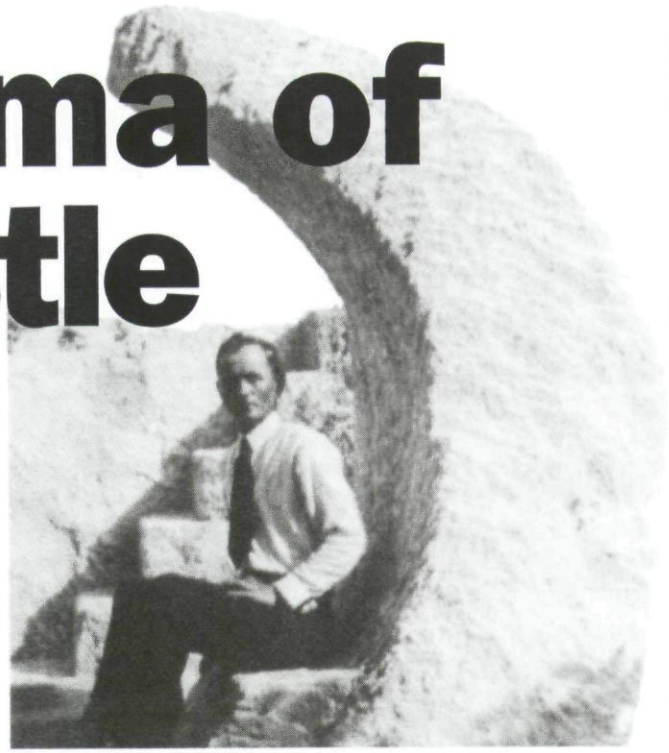


Ed Leedskalnin seated on a castle stone.

THERE IS A CASTLE NEAR MIAMI, FLORIDA, made entirely of huge blocks of limestone. It is claimed that a single man built it alone, using only simple hand tools.[1] The man's name was Edward Leedskalnin (1887-1951). Born in Latvia, he received only a third or fourth grade education. When Ed was 28-years old, he became engaged to marry a 16-year old girl named Agnes Scuffs (Skuvst), whom he called his "Sweet Sixteen." The day before their scheduled wedding, however, Agnes told Ed that he was too poor and too old for her to marry. Heart-broken, Ed sailed to the New World and worked his way through Canada, down into California, east to Texas, finally arriving in southern Florida sometime between 1918 and 1920. Although Ed was just over five feet tall and weighed about 100 pounds he worked in lumber camps and on at least one cattle drive along the way. Sometime during his travels he developed a touch of tuberculosis and decided that Florida's sunny climate would be good for his health. He settled down in the little town of Florida City, located about 27 miles southwest of Miami. There he began to build a coral castle as a tribute to his Sweet Sixteen. The site was first opened to the public in 1923. It took about twenty years to complete most of the castle structures existing today.

How Ed supported himself and paid for the land, tools, and other items for building the castle until it was ready for paying visitors has not been explained, but it is certainly an important part of the mystery. One source says that a neighbor let him build his original castle on borrowed property in Florida City;[2] another claims he bought an acre there.[3] When I purchased a 20-minute video tour of Coral Castle from the castle gift shop, I received gratis an "English Tour Guide" pamphlet that stated that Ed purchased an acre of ground in Florida City for $12. Apparently Ed had made and saved enough money from his labors before he began work on his castle to provide for his necessities (and perhaps even more). Eventually, Ed wrote five pamphlets. Three of them were about "Magnetic Current." One pamphlet titled "Mineral, Vegetable and Animal Life," contains his beliefs about life's cycle. Another titled "A Book in Every Home" contains his thoughts about his domestic and political views, as well as thoughts about his Sweet Sixteen. He made money from giving tours of the castle for a dime to a quarter per person and from the sale of his pamphlets, but most of his money probably came from the sale of some of his land where U.S. Highway 1 passes the castle. In a 16-page color brochure I purchased from the Coral Castle, a man named E. L. Lawrence claims, "Ed told me many times that his livelihood was gained from dividends received from stocks in public utilities."

The Coral Castle website[4] states, "This part of Florida is composed of coral, in some places as much as 4,000 feet thick, covered with only a few inches of topsoil." It also claims that "[W]e cannot find any record of any person who saw

Ed work." Apparently he was a very private man who took great pains to avoid being seen at work. He also carved several pieces of furniture out of the native limestone, including tables, chairs, and a rocker. *Ripley's Believe It Or Not* alleges that Ed's 5,000-pound heart-shaped rock table is the world's largest valentine. The rocking chair is said to weigh three tons.[5]

Moving the Castle

Around 1936, it is alleged that Ed learned that someone was planning to build a sub-division near him. So over the next three years he moved the castle, block by block, about 10 miles north of Florida City to the town of Homestead, where he bought ten acres and reconstructed the castle.[4] Another source[2] reports that Ed moved the castle "three miles north *of* Homestead" (my italics). Still another website[3] states that he moved everything 10 miles away, leaving just one tower behind, and he did it in less than a month. If these sources can't even get the geographical specifications or timing of events correct, what credence should a skeptic give to other aspects of their stories? Today Coral Castle occupies only three of the original ten acres.

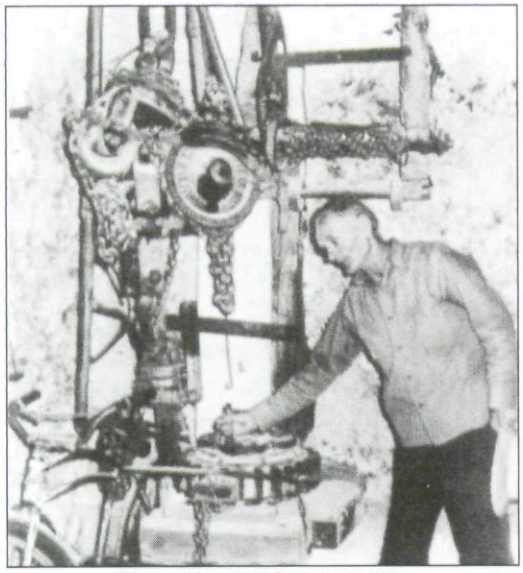
It is said that Ed didn't own a car, but he had a bicycle, which he rode 3.5 miles to town for food and supplies. He also owned a chassis from an old Republic truck.[4] A "chassis" is a rectangular steel frame, supported on springs and attached to the axles, that holds the body and motor of a car or truck. Ed laid two rails on his truck chassis to hold the blocks and asked a friend with a tractor to tow the "loaded trailer" to Homestead. From this, I surmise that at the time of the move the motor in Ed's truck was absent or inoperative. Many people reported seeing the blocks being towed along the old Dixie Highway, but no one (presumably not even the friend who towed his blocks for him) ever saw how Ed loaded or unloaded the trailer.

According to one source,[5] the castle tower is a two-story monolith that housed Ed's workshop and living quarters. (How can a monolith have two stories? The tower and the monolith are two different structures.) A photo of the tower shows that its walls contain at least four layers of blocks, each block weighing 4 to 9 tons. The roof of the tower consists of 30 blocks, each weighing about one ton. The upper level of the tower contained Ed's living quarters; his tool room was in the

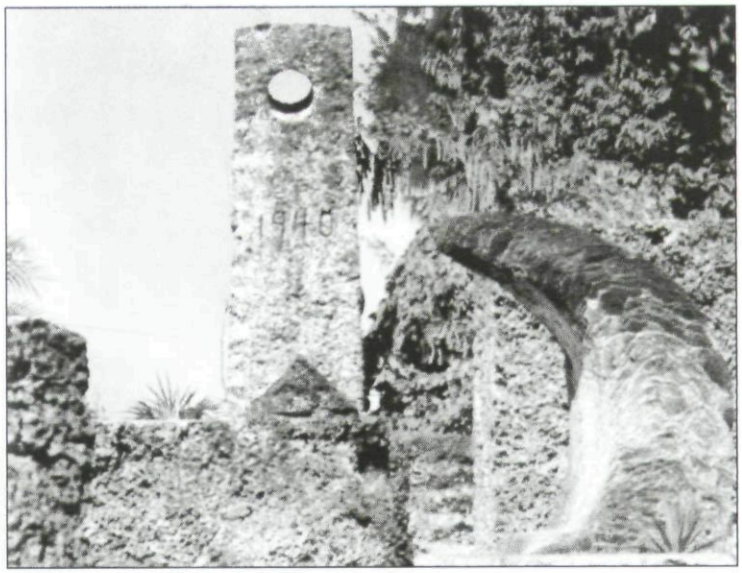
A view of the castle with a 40 foot obelisk in the background.

A heart-shaped table with a live bush as a centerpiece.

A pond representing the full moon, flanked by two quarter moons.



Ed and his electrical generator.

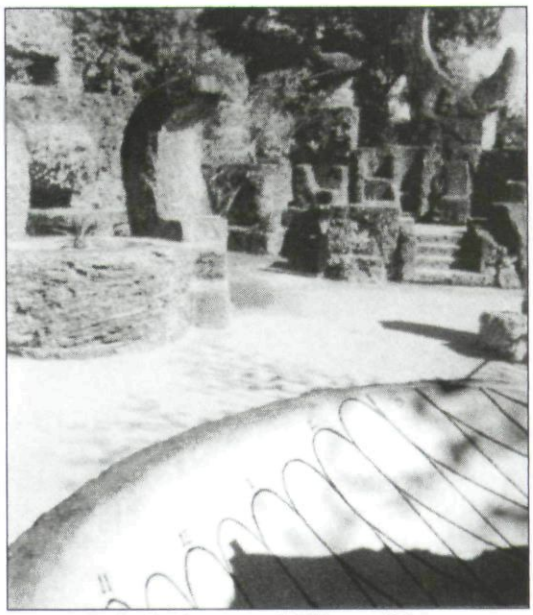


The telescope stone.

lower level. There are 16 steps leading up to the living quarters. Was this designed as another tribute to Ed's sweetheart or just a coincidence? A 40-foot tall obelisk weighing 28 tons (22 tons by another account[6]) appears to be the only giant monolith inside the park walls. It has an opening near its top that is carved in the shape of a Latvian star. The obelisk stands alone near the east perimeter wall of the park opposite the tower. According to the video tour, the obelisk is buried in a shaft 4-5 feet underground. It bears the carved inscriptions: MADE 1928, MOVED 1939, BORN 1887, LATVIA.

Another monolithic structure with a hole near the top, called the "Polaris telescope," is said to weigh 40,000 pounds and stands 25 feet tall (the color brochure says 20 tons on page 6; almost 30 tons on page 5; 28 tons on page 16!). The telescope actually consists of two parts. The free-standing part is located 20 feet outside the north castle wall. The "eyepiece" is a hole located in the north wall. Apertures in both parts of the telescope contain two crossed wires. The North Star (Polaris) can be seen on any clear night by aligning both sets of crosswires. The date 1940 is carved into one side of the telescope. The tour guide pamphlet states that 1940 is the date that Ed *completed* it. This leaves me wondering if construction of the telescope was begun at the Florida City site, or if its construction was both begun and completed at the Homestead site.

Some rock sculptures inside the park represent Mars, Saturn, and other celestial objects. The central block of a triad of sculptures called the "moon fountain" contains the heaviest piece in the park, weighing 30 tons. A complex sundial is carved out of rock, calibrated to noon of the summer and winter solstices, and claimed to be accurate to within two minutes.[5] The tour guide pamphlet claims, "As far as we know, this is the only sun dial of its kind in the world." Data gathered by Ed's observations through the Polaris telescope allowed him to construct the sundial. The



In the foreground: Ed's sundial.

video tour shows the details of the sundial most clearly. Some fuzzy pictures of the sundial are in Stoner's pamphlet. Ed's sundial was constructed to record the hours between 9 am and 4 pm—the hours he believed a man should work (yet Ed reportedly worked at night!).

According to the Coral Castle website, "Coral weighs approximately 125 pounds per cubic foot. Each section of the [castle] wall is 8 feet tall, 4 feet wide, 3 foot (*sic*) thick, and weighs approximately 13,000 pounds." These exact dimensions should weigh 12,000 pounds or 6 tons, but that is still a lot of rock. In June 2005, the website states that the weight of each section is "more than 58 tons!" Obviously, the Coral Castle's website could use some proof-reading. Another website[5] says that the wall blocks weigh approximately 15 tons each, making skeptics dubious about any of these measurements. It has been estimated that the Great Pyramid of Egypt at Giza was built from 2.5 million blocks of limestone, each averaging 2.5 tons (5,000 pounds).[7] If the average limestone block at Coral Castle weighs 6 tons, it would be more than twice as heavy as an average block in the Great Pyramid.

Because a relatively slim 9-ton block of limestone (80 inches wide, 92 inches tall, and 21 inches thick) serves as a revolving door in one wall segment, the site was originally called "Rock Gate Park." (Note: A block with these dimensions contains 89.44 ft^3; at 125 lb/ft^3 it would weigh 5.59 tons, not 9 tons as reported.) A hole was drilled through the exact center of balance and a shaft was inserted as an axis around which the gate could rotate. The bottom of the shaft rests on an old truck bearing; the top of the shaft pivots in the overhead rock roof. No one knows how he was able to do it. The gate was repaired (new bearings, shaft replacement) in 1986 by six men and a 50-ton crane. The gate was so delicately balanced on its pivots that it was said to have moved at the touch of a finger, although today it does not move so easily. Now the gate is left permanently ajar to avoid crushing visitors, but it reportedly still fills the opening within a quarter inch on both sides. Just inside this gate there is a staircase carved out of the ground rock leading down to a subterranean fresh water well. The water table is only about six feet deep in this part of Florida.

The revolving rock door.

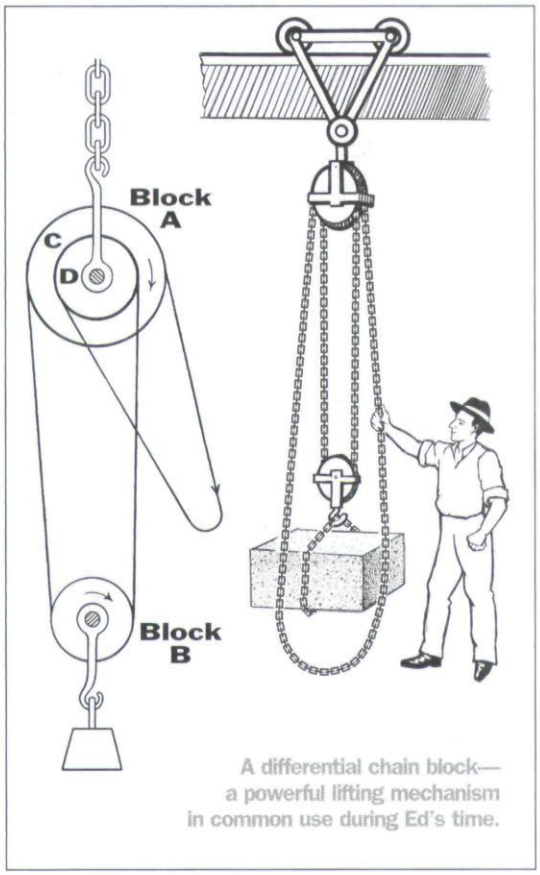
The throne room with stone chairs.

How Did He Do It?

No one knows for sure, but each block of limestone in the castle walls may have required at least five major steps:

Quarrying—releasing the block from the limestone bed of which it was a part. How the blocks were moved from the quarry to the loading site is not known. Photographic evidence suggests that a tripod of poles (supporting a block and tackle) was used to lift the blocks. Unless the blocks could be dragged from the quarry to the tripod, it would need to be moved or rebuilt each time a new rock surface

A tripod tower used with pulleys to raise rocks.



A differential chain block—
a powerful lifting mechanism
in common use during Ed's time.

was quarried, an unlikely procedure.

Loading—lifting the block and placing it on a transport vehicle. Possibly, the legs of the tripod were wide enough to allow backing the truck bed under the hoisted block.

Transporting—moving the loaded vehicle from the loading site to the construction site. The distance between the quarry and the construction site was not specified in any of the references I consulted. If the truck motor was inoperable, could a 100-pound man pull a truck bearing loads weighing several tons?

Unloading—lifting the load from the vehicle and lowering it to the ground at the construction site.

Placing—moving the block to its proper position (location and orientation) in the wall. Even more engineering problems arise when lifting and placing blocks in the multilayered walls of the tower, erecting the monolith, and balancing the rock gate on its pivots.

When asked how he managed to move large limestone blocks, Ed simply replied that he understood the laws of weight and leverage. As an example of a first class lever, with fulcrum or pivot between the weight and the lifting force, let us assume that the limestone block weighs one ton. Theoretically (ignoring the weight of the lever arms), if all of the weight of the block could rest on the end of the "lever arm of the load" just two feet from the fulcrum, and a force of 100 pounds (Ed's weight) is applied to the end of the "lever arm of the force," the latter would have to exceed 40 feet in length to move an entire block off the ground. Of course, lifting just one end or side of a block off the ground to place a rope or cable under it could be done with a shorter lever, but this illustrates one of the problems that a 100-pound man would have in raising any part of a one-ton block by use of levers, let alone a six-ton block. Inside the park walls, the tower is the only enclosed structure. There is an outdoor cookery and rock bathtub, but reportedly there never was any plumbing or electricity.

There are two small, poor quality photographs that show a tripod of wooden poles with a box at the top.[4] The contents of the box are subject to wild speculation. How Ed obtained these poles has not been explained in the references I consulted. If he did not have an operable truck, he must have had the poles delivered to him. One photograph, labeled "Ed with Tripod," shows a man pulling on the line of a pulley attached near the apex of a tripod that I estimate (from the height of 5-foot Ed, whose feet cannot be seen to be on the ground) to be at least 15 feet tall; another pulley appears also to be attached near the apex of the tripod; both lower ends of these pulley lines appear to be wrapped around the same end of a block of limestone resting on the ground. Unless Ed somehow took a photograph of himself, someone else must have taken the picture. This, of course, would argue against the claim that "no one ever saw Ed at work on the castle." Just constructing the tripod itself would present problems for a single worker.

The theoretical mechanical advantage of a lifting device consisting of two blocks with two pulleys or sheaves in each block is equivalent to the number of supporting ropes (4 in this case). Thus, a 100-pound man hanging on the free end of the rope could

balance, but could not raise, a weight of 400 pounds. A gang of more than 30 men, each weighing 100 pounds, would be required to budge a 6-ton weight. What kind of rope could support 6 tons?

When Ed crossed the Atlantic Ocean on a ship, he might have seen winches in operation. While working as a lumberjack, he very likely became acquainted with the use of wedges and saws and ways of moving and loading heavy logs onto transport vehicles via winches. A winch consists of a rope or cable winding on a drum and may have a means for increasing the torque (e.g., reduction gears) and a brake for holding or lowering a load. On some geared winches, the smallest gear can be turned by a hand crank. However, there is no evidence that Ed used a winch to hoist his blocks.

Perhaps one of the most powerful lifting mechanisms in common use during Ed's time was a pulley system known as a differential chain block (shown on the opposite page) which can hoist loads up to 3 or 4 tons "by hand,"[8] or even more if an electric or other kind of motor supplies additional power. Two blocks (A and B) are involved that contain grooved wheels known as sheaves that have link pockets in the groove to keep the chain that passes over them from slipping. The top block (A) consists of a large sheave (C) welded to a smaller sheave (D), both sharing the same axle. An endless chain runs from a power source (perhaps muscle power), around sheave (D) to the sheave in block B whose axle supports the load, then back up to the large sheave (C), then back to the power source. Even a slight difference in the radii of sheaves C and D can produce a very large mechanical advantage. This type of pulley is often used to lift automobile engines, or even the much larger loads required in foundries and other heavy industries.

Saws, drills, wedges (handmade from the leaf springs of a truck), a hand-cranked grinding wheel, hammers (including a sledge hammer?), chisels, crowbars, and chains were reportedly[5] found in Ed's workshop. On viewing the video tour of Ed's tool room, I was pleasantly surprised to see two chain hoists, at least one of which was unmistakably a differential chain block. However, the pictures were of such poor quality that I was not able to calculate even approximately their mechanical advantage. The narrator of the video tour said that these chain hoists could move up to 30 tons. What source supplied the power to lift eight to ten times more weight than could be done "by hand"? The video also shows a clear photograph of Ed using a differential chain block supported by a tripod of poles and hoisting a block of limestone. The video narrator claimed that Ed relied more on his "come along" than on his other hoisting tools. Apparently there was a "come along" hanging on the tool room wall but it was not so identified, and how it was used was not explained. If other chains in the tool room were not part of hoists, of what use could they have been? Perhaps Ed's truck was operational during the construction of the first castle. If the blocks were dragged by the truck from the quarry to the tripod, chains would have experienced less wear during this process than fabric straps or rope. None of the tripod poles he used to hoist the blocks are reported to exist in the park today by any of the references I consulted.

Electromagnetism

Apparently Ed got some of his tools and other building supplies from a junkyard. The rails that Ed "laid" on the bed of his truck chassis would best be welded in place, but no welding equipment was reported in Ed's workshop. However, copper wires, magnets, and welding rods were found there, but no batteries. Ed apparently *thought* he had a good working knowledge of basic electrical principles. He is even said to have built an alternating current (AC) generator (pictures on two websites[4,9]). Magnets mounted on the edge of a flywheel are visible, and they might have served as the rotor, but no stator windings can be seen. A photo on page 14 of the color brochure shows Ed with his hand on the hand crank of his AC generator.

Ed wrote three small books on magnetic phenomena (one website[10] contains free links to Ed's "magnetic current" books) in which he presents instructions for carrying out many kinds of experiments with magnets (both permanent and electric). In these books, he used welding rods for some of his experiments; at some time he also had a car battery, and he made 6-8 volt light bulbs shine by alternating current. Today, some 4-wheel drive vehicles have a winch mounted on the front that operates from direct current (DC) battery power. So if Ed could have built or obtained a DC electric motor, he could have used it to run a

winch. Using a battery to run a winch would deplete its energy rapidly and it would need repetitive replacement or recharging. Recharging a car battery by a hand-cranked generator would be an arduous task. So if Ed used battery power to hoist loads he would have needed a source of mechanical energy (such as an internal combustion engine) to turn the armature (windings of copper wire) of an electric generator; the generator supplies an electric current in the stationary armature that turns the rotor of an electric motor to obtain mechanical rotation. Electric motors receiving alternating current usually run at constant speed, whereas the speed of motors receiving direct current (DC) can be controlled to some extent and the starting torque is much greater than in AC motors. Thus, electric motors used for hoists would preferably be powered by DC rather than AC. So why didn't Ed build a DC generator instead of an AC one? Furthermore, a DC generator could be used to recharge his storage battery whereas an AC current would first need to be rectified to DC for that purpose.

Christopher Dunn claims that he actually saw Ed's AC generator mounted on the front end of a crankshaft from a 4-cylinder motor (now missing).[6] What became of the rest of the engine, its generator, and battery? If Ed could generate AC electric power by a reciprocating engine, why did the device have a hand crank and why was it claimed that he often worked at night by lantern light instead of by electric light? Since he used a car battery in his electrical experiments, he could even have rigged lights to run on DC power without the need of a generator (except to recharge the battery). Dunn wonders if Ed used the crank to start an engine rather than generate AC power by hand.

The Geology of Coral Castle

Some people have tried to connect Coral Castle to the Bermuda Triangle, because one apex of the triangle resides at or near Miami.[11] One of the legs of the Triangle connects to the island of Bimini in the Bahamas where rows of limestone lie buried under 15 feet of water—blocks that some believers claim to be the ruins of the lost continent of Atlantis. Geologist Eugene A. Shinn presents evidence that these blocks were not carved by humans, but formed by a natural process of precipitation of calcium carbonate, explaining:

> [B]eachrock forms out of sight beneath the sand. As more sand is added, the beach builds out with the rock following just beneath. However, if conditions change and the beach is eroded, the rock is exposed. ...After a few years in the sun, the rock layers, usually about one-foot thick, crack much like old concrete roads and sidewalks. The pieces can be large, up to twelve feet in length and four to six feet wide [these two dimensions are coincidentally approximately the same as the blocks in the wall of Coral Castle]. With continued erosion by wave-driven beach sand, the cracks enlarge and take on a rounded shape. The result is rows of huge pillow-shaped stones that appear to have been fitted neatly together, much like the stone walls high in the mountains at the Peruvian ruins of Machu Piccu.[12]

After reading Shinn's article, I wondered if he could tell me anything more about the nature of the limestone of Coral Castle. Shinn e-mailed me and said that the local Miami oolite limestone in South Florida can be cut with an ax or even a carpenters saw. As a result of my inquiries, Shinn visited the Coral Castle and reported in another e-mail:

> There is a quarry alongside of the Castle but only part of that stone was used in its construction. Most of the castle is constructed from oolite that was quarried somewhere else, but probably not more than a mile away.
>
> The Florida East Coast railway (Henry Flagler's railroad to Key West was completed in about 1912 and destroyed by the hurricane of 1935) ran very close to the castle. The tracks have been removed but I remember when it ran right next to US 1. In fact in the early 1940s the state obtained the rail bed and built the new US 1 on the old rail bed.
>
> The main reason I went to see the castle was to determine if the stones might actually be Key Largo limestone. They are not. Key Largo limestone, the fossil coral reef that forms the Florida Keys, was quarried about 50 miles south of Homestead and the railroad was used to bring it to Miami. Many Miami landmarks (the downtown post office and the Coral Gables Court House and many others) were constructed with the Key's limestone. My suspicion was that the castle was made of that stone and simply dropped off a flat bed rail car right where the castle sits. Well I was wrong. It is made of the local Miami oolite. There is still the possibility that the stones were moved on a flat bed car from just down the

road a mile or two. So there is the challenge. Where did it come from and how did he move it?

Some types of rock can be split by chiseling or drilling holes and then pounding wedges into the holes. The photos of furniture and other structures in the Coral Castle website show limestone surfaces that appear to be pock-marked or rough-hewn rather than smooth, perhaps indicating that the blocks were split or chiseled rather than sawed. However, the tour guide pamphlet claims that "The only man made marks you will see in the Castle are some wedge marks" and almost all of the carvings inside the Castle today were done in Florida City. A hand saw might be useful in shaping a block once it is removed from its bed, but I do not understand how it could be of much use for quarrying at depths of more than a foot or two. According to Shinn, the rock at Coral Castle is about 120,000 years old and was deposited as lime sand bars when the sea level was about 20 feet higher than at present. The large blocks are the typical size that were quarried in the area. Many old buildings in the Miami area were constructed from it. Shinn remarked "Whether Leedskalnin quarried the blocks himself or obtained them from a commercial quarry I do not know." In contrast to the limestone used to build Coral Castle, Shinn's so-called "beachrock" is very hard; he had to use diamond tip core bits to drill into it. Carbon-14 data revealed that the Bimini beachrock was only 2,000 to 4,000 years old—much too young to be part of Atlantis, which Plato, the originator of the Atlantis story, set 9,000 years into his past. Others date the lost civilization to at least 15,000 years ago.[13]

Conclusion

Although Ed invited Agnes Scuffs to visit his castle, she never saw the monument he had erected in her honor. He never married. When he became ill in December of 1951, he took a bus to Jackson Memorial Hospital in Miami, where he died in his sleep three days later at the age of 64. He was buried in Miami Memorial Park Cemetery. His death has been variously attributed to malnutrition, kidney failure, and stomach cancer. Ed constructed his castle over a period of about 28 years, carving and sculpting over 1,100 tons of coral rock, and he was still working on it up to the time of his death. Ed's only living relative, a nephew named Harry Leedskalnin, inherited Rock Gate Park. When Harry sold it to another family in 1953, Rock Gate Park was renamed Coral Castle. Upon inspection of the property, a note was found containing instructions that led to the discovery of thirty-five $100 bills—Ed's life savings. Is it possible that Ed's nephew or those who purchased the Coral Castle removed and did not report any of the power tools left there—perhaps to enhance the mystique of Ed's accomplishments?

Regardless, Coral Castle has been added to the National Register of Historic Places by the United States Department of The Interior. While some folks believe that Ed used miraculous powers to build his castle, scientists and skeptics do not immediately grasp at paranormal straws to explain events that have so many inconsistencies and so few indisputable facts as those in this case. We simply accept that, at the present time, how Coral Castle was built remains partially unknown. Even allowing for the possible use of power tools and the help of other people, Ed Leedskalnin apparently designed and built—not once, but twice—an awe-inspiring structure that remains an enigma to this day. I am reminded of the old adage "Love conquers all." ▼

References

1. *The Enigma of Coral Castle* is a 45-page pamphlet authored by Ray N. Stoner in 1983. The Preface of this pamphlet was written by Michael H. Bradford, Executive Director of the Bradford Institute of Ultra Science in Cape Coral, Florida. Bradford states that Ray N. Stoner holds a Bachelor of Science degree in the Ultra Sciences. This pamphlet can be purchased from the gift shop of Coral Castle. Stoner compares the common characteristics of four megalithic sites: The Great Pyramid at Giza, Egypt; Stonehenge, England; The Pyramid of the Sun, Teotihuacan, Mexico; Coral Castle, Homestead, Florida. I found most of Stoner's thesis involves geometry, mathematics, and pseudoscientific/paranormal conjectures.
2. http://www.worldofthestrange.com/nlv412.html
3. http://www.agilitynut.com/h/coralcastle.html
4. http://www.coralcastle.com
5. http://www.crystalinks.com/coralcastle.html
6. http://www.atlantisrising.com/issue12/ar12coralcastle.html
7. Linse, Pat. 2000. "The Mystery of the Pyramids," *Junior Skeptic*, Vol.8, No. 2, 97.
8. *Van Nostrand's Scientific Encyclopedia*, 3rd edition, 1958, D. Van Nostrand Company, Inc., Princeton, NJ, p. 307.
9. http://www.labyrinthina.com/coral.htm
10. http://atl2.netfirms.com/engy/leedskal.htm
11. Loxton, Daniel. 2003. "The Bermuda Triangle," *Junior Skeptic*, Vol.10, No. 3, 96.
12. Shinn, E. A. 2004. "A Geologist's Adventures with Bimini Beachrock and Atlantis True Believers." *Skeptical Inquirer* 28(1):38-44.
13. Fagan, G. G. and C. Hale. 2001, "The New Atlantis and the Dangers of Pseudohistory." *Skeptic* Vol.9, No. 1, 78-87.